

TM 11-6665-248-10

TECHNICAL MANUAL

OPERATOR'S MANUAL

**CALIBRATOR, RADIAC, AN/UDM-6
(NSN 6665-00-767-7497)**

HEADQUARTERS, DEPARTMENT OF THE ARMY
ENC 4

26 NOVEMBER 1982

WARNING

RADIATION HAZARD



Use Radiac Calibrator AN/UDM-6 only under the guidance of an installation/activity (local) Radiation Protection Officer and in accordance with requirements of Chapter 5, Section IV, AR 40-5 and AR 385-11.

Plutonium 239 (Pu239) is dangerous to living tissue. Small amounts of Pu239, when inhaled, ingested, or absorbed in open cuts or wounds, can cause serious illness or death. To avoid accident, observe the following:

- Use and store the calibrator only in designated radiation controlled areas.
- Do not eat, drink, smoke, apply cosmetics, or store food stuffs, drinks, tobacco, or cosmetics where the calibrators are used or stored.
- Do not allow personnel with open skin wounds to handle or work with the calibrators without the approval of the medical officer and the (local) Radiation Protection Officer (RPO).
- Prohibit loitering in the area by unauthorized personnel.
- Handle the calibrator carefully. Do not drop, rough handle, alter or damage it in any way. Mishandling can cause source leakage.
- Do not touch the source surface with your hands. Wear plastic or surgical type protective gloves which allow sufficient dexterity during calibration and leak testing. Avoid contact of objects, such as tools, instruments, and components of the set, with the sources.
- Always wash and dry your hands thoroughly after handling the calibrator; check your hands with a low-range alpha radiac meter; repeat the washing and drying, if necessary. Notify the Radiation Protection Officer if washing does not remove contamination.
- **DO NOT ATTEMPT TO CLEAN THE SOURCE OR SOURCE HOLDERS.**

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HEADQUARTERS
DEPARTMENT OF THE ARMY,
WASHINGTON, DC, 26 November 1982

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(NSN 6665-00-767-7497)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located in the back of this manual direct to: Commander, US Army Communications-Electronics Command, and Fort Monmouth, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703.

A reply will be furnished direct to you.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. Scope

This manual describes Calibrator, Radiac AN/UDM-6 and covers its installation and operation. It includes instructions for initial service, operation, cleaning, and inspection of the equipment. The AN/UDM-6 provides a calibration check for the AN/PDR-54 and AN/PDR-60 Alpha Radiac Sets (radiac sets). The calibrators contain plutonium which is controlled by the US Nuclear Regulatory Commission (NRC), Title 10 Code of Federal Regulations. AR 385-11 and AR 700-64 implement NRC regulations. Army-wide possession and use of the calibrators are authorized by a Special Nuclear Materials License issued to Department of the Army, US Army Communications-Electronics Command, Fort Monmouth, NJ 07703. The license is issued on the basis of statements concerning procedures established for the life-cycle control of the items. The sets are issued to authorized Army calibration activities, schools, and research and development laboratories through the US Army Communications-Electronics Command (CECOM) National Inventory Control Point (NICP), (DRSEL-MME-VC). Established Army supply procedures are augmented by radiological control procedures (AR 385-11).

1-2. Maintenance Forms, Records, and Reports

a. Reports of Maintenance and Unsatisfactory Equipment. Department of Army forms and procedures used

for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System (TAMMS).

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73/AFR 400-54/MCO 4430.3E.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33B/AFR 75-18/MCO P4610.19C/DLAR 4500.15.

1-3. Reporting Equipment Improvement Recommendations (EIR)

If your AN/UDM-6 needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. We'll send you a reply.

1-4. Index of Technical Publications

Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes or additional publications pertaining to the equipment.

Section II. US NUCLEAR REGULATORY COMMISSION REQUIREMENTS

1-5. General

The NRC sets standards/conditions and issues licenses for the use of radioactive materials in the United States. The AN/UDM-6 comes under the NRC regulations and a license for its use has been issued. Information required by the NRC license and regulations is contained below:

a. Radiation Protection. Users of the AN/UDM-6 should refer to instructions on control, safe handling, storage, emergency situations and operation and maintenance instructions contained in this technical manual. This satisfies the radiation protection requirements of the NRS regulations (Title 10, Code of Federal Regulations, Parts 19 and 20).

b. Notice to Employees. Form NRC-3, Notice to Employees, contained in the back of this manual, must be removed for posting wherever the AN/UDM-6 is

used and/or stored. The posting requirements are contained on the form.

c. NRC License. The NRC license for the AN/UDM-6 and documents relating to that license are held by the US Army Communications-Electronics Command Safety Office at Fort Monmouth, NJ. AN/UDM-6 users may request further information on these documents by letter addressed to:

Commander
US Army Communications-Electronics Command and
Fort Monmouth
ATTN: DRSEL-SF-MR
Fort Monmouth, NJ 07703

Requests for further information may also be made by phone by calling on AUTOVON 995-4427 or COMMERCIAL (201) 544-4427.

1-6. Responsibility

a. Responsibilities of Major Commands.

(1) Establish at least one Radioactive Material Control Point (RMCP) (AR 385-11).

(2) Appoint a Radiation Control Officer (RCO) for each RMCP and forward two copies of appointee's orders and qualifications to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-SF-MR, Fort Monmouth, NJ 07703.

(3) Develop implementation procedures to insure periodic leak testing (para 1-7j) and forward two copies of procedures to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-SF-MR, Fort Monmouth, NJ 07703.

(4) Forward leak test smears to nearest approved smear counting station for evaluation (para 2-2b).

(5) Insure that each installation or activity using the AN/UDM-6 has an effective radiation protection program.

b. Responsibilities of Radiation Control Officer.

(1) Review and approve the qualifications of each local Radiation Protection Officer (RPO) for the AN/UDM-6 and forward to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-SF-MR, Fort Monmouth, NJ 07703 a list of these local RPO's and their qualifications for approval and certification.

(2) If a qualified local RPO is not available, take one or more of the following actions:

(a) Suspend requisition for the AN/UDM-6.

(b) Suspend use of the AN/UDM-6 until someone can be qualified by training.

(c) Transfer the AN/UDM-6 to an installation or activity with qualified personnel.

(3) Maintain the following records for each AN/UDM-6 under his control:

(a) National stock number.

(b) Description.

(c) Serial number.

(d) Isotope, source activity, and date activity was determined.

(e) Dates and results of leak tests.

(f) Shipment number.

(g) Shipped from.

(h) Shipped to.

(i) Date shipped.

(j) Date of manufacture.

(k) Name of manufacturer.

(l) Name of qualifications of local RPO's.

(m) Radiation incident reports.

(4) Insure that the AN/UDM-6 is properly handled in accordance with Army, DOD, and NRC regulations. Periodically inspect and audit records of installations

and activities possessing the AN/UDM-6.

(5) Assure that a Radiation Incident Report is submitted by electrical means to Commander, US Army Communication-Electronics Command and Fort Monmouth, ATTN: DRSEL-SF-MR, Fort Monmouth, NJ 07703, within 24 hours after an incident occurs.

(6) Consolidate and forward DA Form 3252-R (Radioisotope Inventory and Leak Test Report) (RCS DRC-192) listing all Calibrators, Radiac AN/UDM-6 in area of responsibility to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-SF-MR, Fort Monmouth, New Jersey 07703 at least quarterly (31 January, 30 April, 31 July and 31 October). Reports may include information on other CECOM managed calibration and test items of supply listed in AR 385-11.

1-7. Supervision

a. All calibration in which the AN/UDM-6 is used will be supervised by a qualified RPO. To be qualified as an RPO, a person must have received a minimum of 40 hours formal training on radiation, including the following topics:

(1) Principles and practices of radiation protection.

(2) Biological effects of radiation.

(3) Radioactivity measurement standardization, monitoring techniques, and associated instrumentation.

(4) Mathematics and calculations basic to the use and measurement of radioactivity.

(5) The operation and use of the AN/UDM-6.

NOTES

Completion of the Radiological Safety Course at the US Army Chemical School or at the US Army Ordnance Center and School meets these requirements.

Where circumstances warrant, alternate training may be substituted if this training is approved by Commander, US Army Communications-Electronics and Fort Monmouth, ATTN: DRSEL-SF-MR, Fort Monmouth, NJ 07703. Such training must be received under the guidance of a qualified RPO, and must include at least 16 hours of actual experience in the use of the AN/UDM-6.

b. The person appointed as RPO may be a commissioned officer, a warrant officer, an enlisted man, or civilian, if they meet the minimum qualifications prescribed above. An RPO designated custodian for the AN/UDM-6 is a specified person designated to control the use of the AN/UDM-6.

c. The operator of the AN/UDM-6 shall have a minimum of 8 hours training, under the guidance of a

qualified RPO, in the following:

- (1) Fundamentals of radiation operations.
- (2) Radiac instrumentation theory.
- (3) Application and survey techniques.
- (4) Safe working practices and inherent hazards associated with the AN/UDM-6.
- (5) On-the-job training in operation and care of the AN/UDM-6.

1-8. Duties of Radiation Protection Officer (RPO)

The specific duties of the appointed RPO will be to:

- a. Insure that the AN/UDM-6's under his jurisdiction are properly used and stored.
- b. Train and maintain a listing of users and the specific training provided.
- c. Insure records are maintained on each equipment.
- d. Advise RMCP of any forthcoming change in accountability, local RPO, or installation relocation for the AN/UDM-6.
- e. Submit Radiation Incident Reports according to published directives.
- f. Establish radiation control procedures for AN/UDM-6 storage and use.
- g. Post "Radioactive Material" warning signs.
- i. Immediately refer actual or suspected overexposure to medical officer.
- j. Insure that periods of time between leak tests do not exceed 3 months and supervise performance of leak tests.
- k. Secure items against unauthorized use and removal.
- l. Insure that all Army, DOD, and Federal Regulations are being followed and that personnel are exposed to a minimum of radiation consistent with practical considerations.
- m. Conduct a physical inventory according to published frequencies.
- n. Submit inventory, leak test, and other reports to RMCP as required.
- o. Place all AN/UDM-6's under his jurisdiction under the control of a newly appointed RPO approved by the RMCP and CECOM. If replacement RPO has not been appointed, the AN/UDM-6's shall be placed in locked storage.
- p. Investigate each case of excessive or abnormal exposure to determine the cause. Recommend remedial action to prevent recurrence. Submit a complete written report to the Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN:DRSEL-SF-MR, Fort Monmouth, NJ 07703, within 24 hours after the incident.

1-9. Requisitioning Procedure

Stations in CONUS and Oversea supply agencies will submit requisitions through radioactive material supply channels to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-MME-VC, Fort Monmouth, NJ 07703. The AN/UDM-6 shall be issued only to certified Radiation Protection Officers. All requisitions will be accompanied by the name of the Radiation Protection/Control Officer who is to be responsible for the equipment. In addition, each request will include the following certification: "As required by chapter 3, AR 385-11, sufficient safety equipment, facilities, and trained personnel are available at this installation for the safe handling, use and storage of radioactive material ordered on this requisition." The certification must have the signature and the typed name and grade of the appropriate radiation control officer.

1-10. Emergency Situations

The procedure outlined below will be followed in an emergency situation.

a. Loss of AN/UDM-6.

- (1) Attempt to recover the AN/UDM-6.

(a) Review records to determine to responsible individual.

- (b) Make a physical survey.

(2) If the AN/UDM-6 is recovered, adjust custodial requirements as necessary to prevent a recurrence.

(3) If the AN/UDM-6 is not recovered, report the loss through command channels to the Area Radioactive Material Control Point (AR 385-11) and to the US Army Communications-Electronics Command stating the serial number of the AN/UDM-6, the circumstances involved, and the action taken to prevent recurrence.

b. Internal Exposure of Personnel.

(1) Internal exposure is the result of personnel becoming contaminated when radioactive particles are inhaled, swallowed, or absorbed through breaks in the skin.

(2) In the event of a known or suspected internal exposure:

(a) Obtain immediate medical advice from the Medical Officer.

(b) Remove the individual from duties involving occupational exposure to ionizing radiation until subsequent exposure limitations are established by proper medical authority (AR 40-14):

(c) Prepare written report of circumstances leading to the internal exposure; include serial number(s) of the AN/UDM-6 involved, action taken to prevent recurrence, and other applicable information. Forward the report through proper channels to: Com

mander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-SF-MR, Fort Monmouth, NJ 07703.

c. Damage or Leaking AN/UDM-6. The AN/UDM-6 could begin to leak as a result of being dropped, damage to the source, or even as a result of age. Action required in the event of a known or suspected leaking AN/UDM-6 is:

(1) Discontinue use of the AN/UDM-6. Cover it with plastic, seal it with tape, and label it as contaminated.

(2) Check personnel, equipment, and areas for possible contamination and decontaminate as required.

(3) Report the item to the Radioactive Material Control Point and to the US Army Communications-Electronics Command.

(4) Dispose of the AN/UDM-6 as directed by the US Army Communications-Electronics Command, the US Army Ionizing Radiation Dosimetry Center and the Radioactive Material Control Point.

(5) Report the completed disposal action to the US Army Communications-Electronics Command, ATTN: DRSEL-SF-MR, Fort Monmouth, NJ 07703 and the Radioactive Material Control Point.

d. Firefighting Emergency Procedures.

(1) *General.* Emergency plans must include procedures for combating fires involving radioactive items. Plans should be commensurate with the quantity and type of items present. Firefighting personnel must know the locations(s) of the items and must be familiar with radiation protection procedures. As a general rule, personnel should wear protective respiratory equipment when fighting fires involving radioactive items.

(2) *Emergency procedures.*

(a) Evacuate personnel in the immediate area who are not directly involved.

(b) Notify the fire department.

(c) Extinguish the fire, if possible, and if radioactive materials are involved, with possible release to the environment, clear personnel from downwind area immediately.

(d) Notify the RPO.

(e) Notify medical personnel when appropriate.

(f) Control access to the immediate area.

(g) Check personnel, equipment, supplies, and environs with appropriate alpha radiation survey

instrument.

(h) Decontaminate personnel, equipment, supplies, and environs.

(i) The RPO shall record and report the results of the fire.

1-11. Transportation

The AN/UDM-6 requires packaging and shipment in accordance with the requirements set forth in Title 49, Code of Federal Regulations (49 CFR) of US Department of Transportation (DOT) regulations and AR 385-11. These regulations require all appropriate information on radioactive shipments to be incorporated onto shipping documentation as follows:

a. Proper shipping name (49 CFR 172.101): Radioactive Material, NOS.

b. Hazardous Material Identification Number (49 CFR 172.202): NA9181.

c. Pieces, weight, cube (49 CFR 172.202): One wooden case, 14-3/16 inches \times 10-5/8 inches \times 1-3/16 inches, with cushioning pad containing four jigs, 9-3/8 inches \times 3-3/16 inches \times 11/16 inch, made of anodized aluminum. Four radioactive sources are 2-inch diameter stainless steel disks with a coating of Pu239 applied to one side.

d. Type of packaging (49 CFR 172.202): Wooden case.

e. Name of radioactive material as listed in 49 CFR 173.390 (49 CFR 172.203): Pu239.

f. Description of chemical and physical form (49 CFR 172.203): Plutonium 239, solid applied as coating.

g. Activity (49 CFR 172.203): 1.4 microcuries.

h. Type label (49 CFR 172.203): Shipment of individual item requires no label as per 49 CFR 173.391(a). Shipment of 8 or more items as one package requires RADIOACTIVE WHITE I (SF 413) labels.

i. The words FISSILE EXEMPT shall appear on the shipping documentation as required by 49 CFR 173.396(a).

j. Shipper's certification (49 CFR 172.204): As applicable.

k. Shipments of Plutonium 239 must be made in accordance with the applicable provisions of DOT and NRC regulations. At the present time, all shipments of the AN/UDM-6 should only be made by surface transportation.

l. Any other information as required.

Section III. DESCRIPTION AND DATA

1-12. Equipment Description

(fig. 1-1)

a. General. The Calibrator, Radiac AN/UDM-6 consists of a wooden case that contains four jigs, a perforated metal mask, a dust cover for each jig, and a cushioning pad. Each jig contains a Plutonium 239

(Pu239) radioactive standard source. The alpha particle counting rate is marked in the frame of the jig. The dust covers are used to cover the jigs not in use. The cushioning pad fits over the jigs to hold them in place when the case is closed.

b. Radioactive Standard Sources. The radioactive

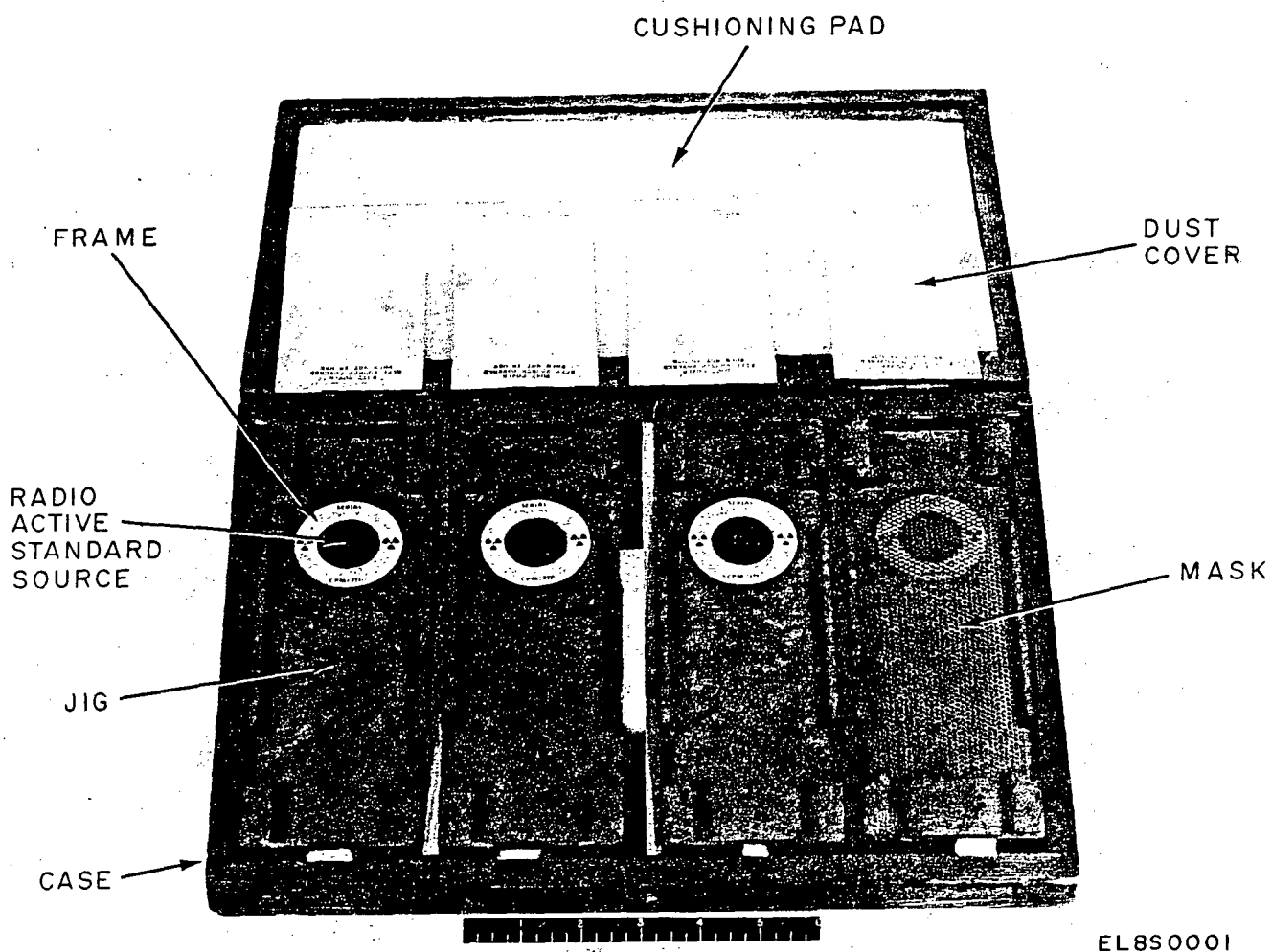
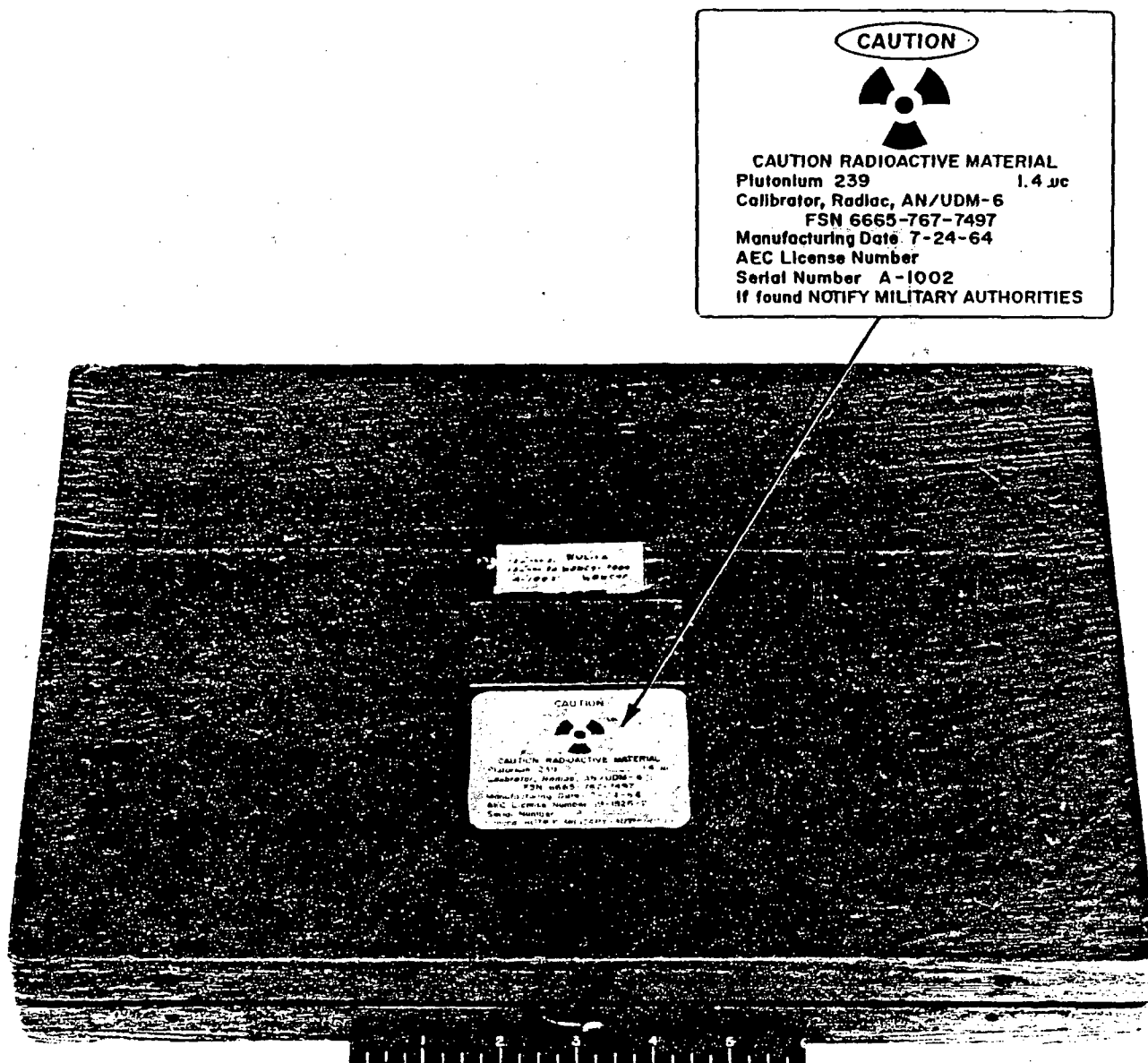


Figure 1-1. Radiac Calibrator AN/UDM-6, Cover Open.



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Figure 1-2. Label.

standard sources are 2-inch diameter stainless-steel disks. A coating of Pu239 (1-inch diameter) is applied to the surface of one side of each disk. A nonradioactive frame (1/2-inch wide) is around the radioactive surface. The frame is marked with the manufacturer's code number, two radiation symbols, and the alpha counting rate of the calibrated source. Each source is attached to a jig with screws.

c. Jigs. The jigs are made of anodized aluminum. The jigs are designed so that when the probe of the radiac being calibrated is placed upon the jig it is the proper distance above the standard source. The jigs are arranged from left to right in an ascending sequence according to the alpha counting rate of each source. The counting rates are approximately 1,400 (1.4×10^3), 14,000 (1.4×10^4), 140,000 (1.4×10^5), and 1,400,000 (1.4×10^6) counts per minute, respectively. The alpha counting rate marked on each source is accurate to within ± 4 percent. (If the radioactive sources are accidentally touched, the counting rates of the sources may be altered sufficiently to warrant recalibration.)

d. Mask. The mask is a flat rectangular sheet of perforated stainless steel. It is designed to fit in any of the four jigs. The portion of the mask that lies flat directly

over a radioactive standard source cuts the alpha particle counting rate to 38 percent of the normal counting rate.

e. Case. The case for the AN/UDM-6 is a wood box with a hinged cover. When the case is fully open, the cover lies flat. A label (fig. 1-2) is affixed to the top of the case.

1-13. Tabulated Data

Radioactive material	Plutonium 239 (Pu239)
Type of radiation	Alpha particle emission
Energy of alpha particles	5.15 Mev.
Total quantity in calibrator	1.4 microcuries (approx.)
Half life	24,360 yr.
Number of jigs	4
Number of radioactive standard sources	4
Transmission factor of mask	38 percent
Jig (approx.):	
Length	9 3/8 in. (23.8 cm)
Width	3 3/16 in. (81.1 cm)
Height	11/16 in. (1.8 cm)
Case (approx.):	
Length	14 3/16 in. (36.0 cm)
Width	10 5/8 in. (27.0 cm)
Height	1 3/16 in. (3.0 cm)
Serial numbers	A 1000 through A 1385

CHAPTER 2

OPERATING INSTRUCTIONS

WARNINGS

Use the AN/UDM-6 only under the guidance of an installation/activity (local) Radiation Protection Officer and in accordance with requirements of Chapter 5, Section IV, AR 40-5 and AR 385-11.

Plutonium 239 (Pu239) is dangerous to living tissue. Small amounts of Pu239, when inhaled, ingested, or absorbed in open cuts or wounds, can cause serious illness or death. To avoid accident, observed the following:

- (a) Use and store the AN/UDM-6 only in designated radiation controlled areas.
- (b) Do not eat, drink, smoke, apply cosmetics, or store food stuffs, drinks, tobacco, or cosmetics where the AN/UDM-6 is used or stored.
- (c) Do not allow personnel with open skin wounds to handle or work with the AN/UDM-6 without the approval of the medical officer and the (local) Radiation Protection Officer.
- (d) Prohibit loitering in the area by unauthorized personnel.

2-1. Service Upon Receipt of Equipment

a. Perform the required DOT radiation surveys and wipe tests of the AN/UDM-6 package (AR 385-11 and AR 700-64).

b. Unpack the AN/UDM-6.

c. Inspect the wood case to see that it is undamaged and that the label (fig. 1-2) is attached to the cover.

d. Put on protective gloves.

e. Open the case fully. Remove the cushioning pad and set it in the cover of the case. Check the mask to make sure that it is flat. If the mask is deformed (does not lie perfectly flat), it is unserviceable. A deformed mask will not provide the proper transmission factor, may come in direct contact with a radioactive source and damage it, or may become contaminated.

f. Check the markings on the standard sources and see that the jigs are properly arranged in the case.

g. Perform a leak test (wipe test) (para 2-2) on all the sources to make certain that they are undamaged.

h. Replace the mask and the cushioning pad and close the case.

2-2. Initial Checks and Services

NOTE

A leak test must be performed immediately upon receipt of the AN/UDM-6 and at least every 3 months thereafter, while it is in use.

a. Perform the leak test as follows:

(1) Five 1-inch smear papers (Whatman filter papers or equivalent) are required. The smear papers are supplied in a kit which is periodically replaced. These kits are available from Commander, US Army Ionizing Radiation Dosimetry Center, ATTN: DRSMI-MCI-DC, Lexington, KY 40511 or from the CECOM Safety Office. They are also commercially available.

(2) With a ballpoint pen or china marker, number the smear papers consecutively. Key each smear paper to each item to be checked. For example, number the jigs from left to right 1 through 4. The number can be marked on the case with a china marker. Number the mask number 5. If necessary, this can be marked on the mask with a china marker without affecting its properties.

(3) Dampen the smear papers with water. Do not soak them.

(4) Put on protective gloves.

WARNING

Plutonium 239 is DANGEROUS. Handle the AN/UDM-6 carefully. DO NOT TOUCH THE RADIOACTIVE STANDARD SOURCE SURFACE. Avoid contact of objects, such as tools, instruments, and calibrator components with the sources. Wear plastic or surgical protective gloves when performing leak tests and calibrations.

b. Open the case and wipe each radioactive standard source frame and jig with the same smear paper. DO NOT TOUCH THE RADIOACTIVE STANDARD SOURCE WITH THE SMEAR PAPER.

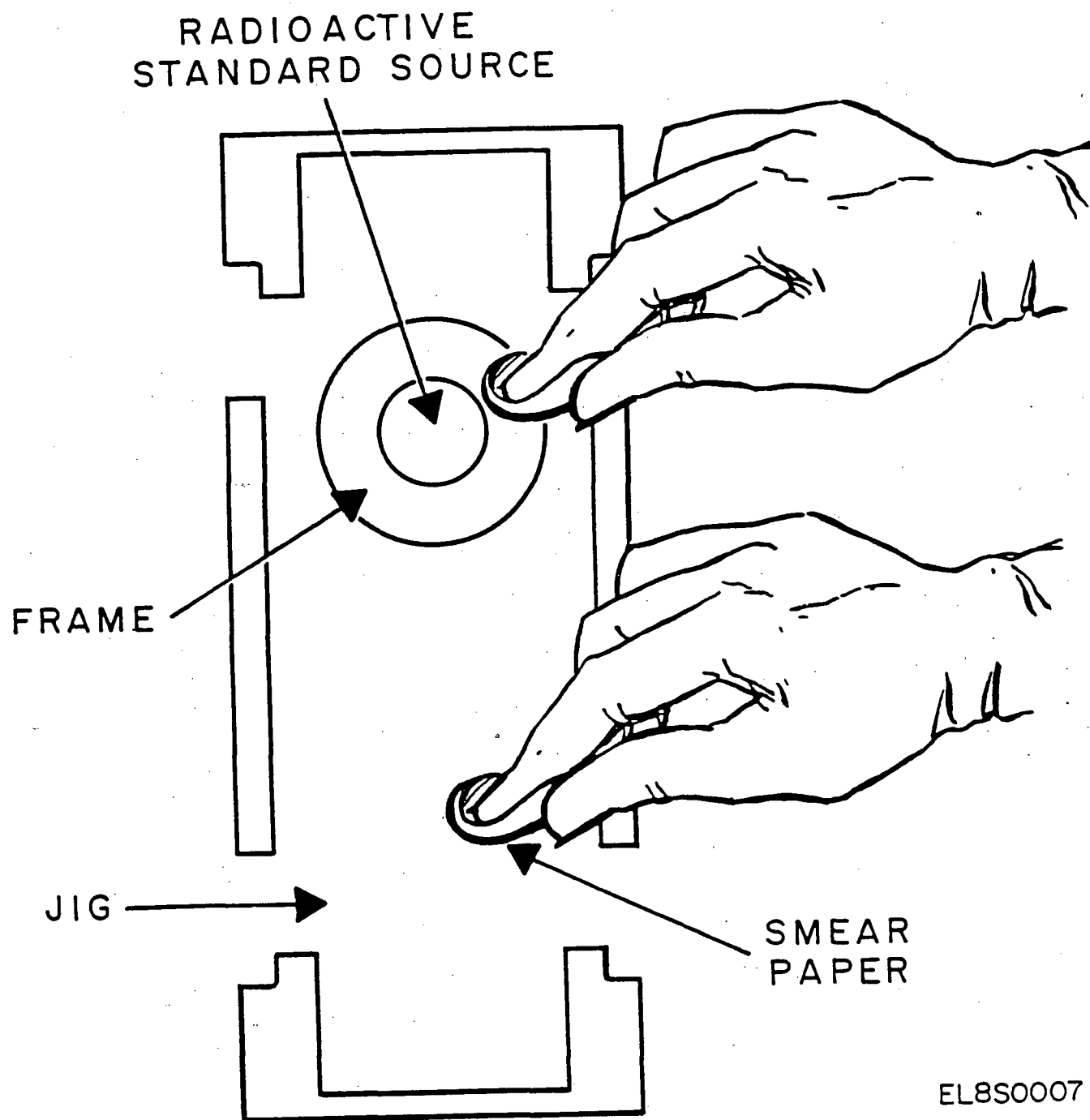
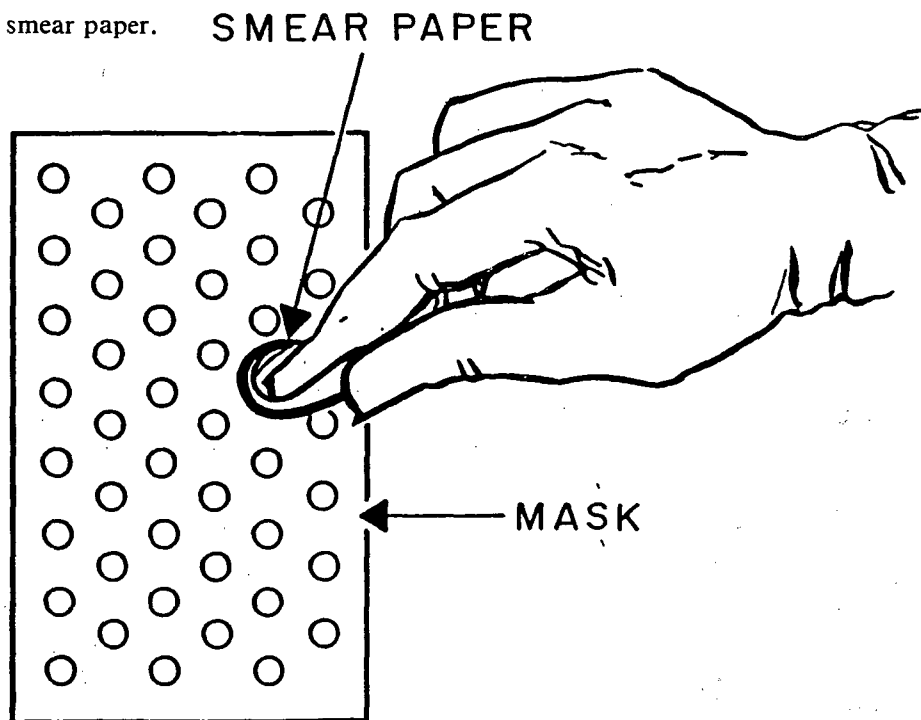


Figure 2-1. Wiping a Jig.

c. Wipe the mask with the smear paper.



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Figure 2-2. Wiping the Mask.

d. Place the smear papers on a flat surface with smeared side up. Allow the smear papers to dry.

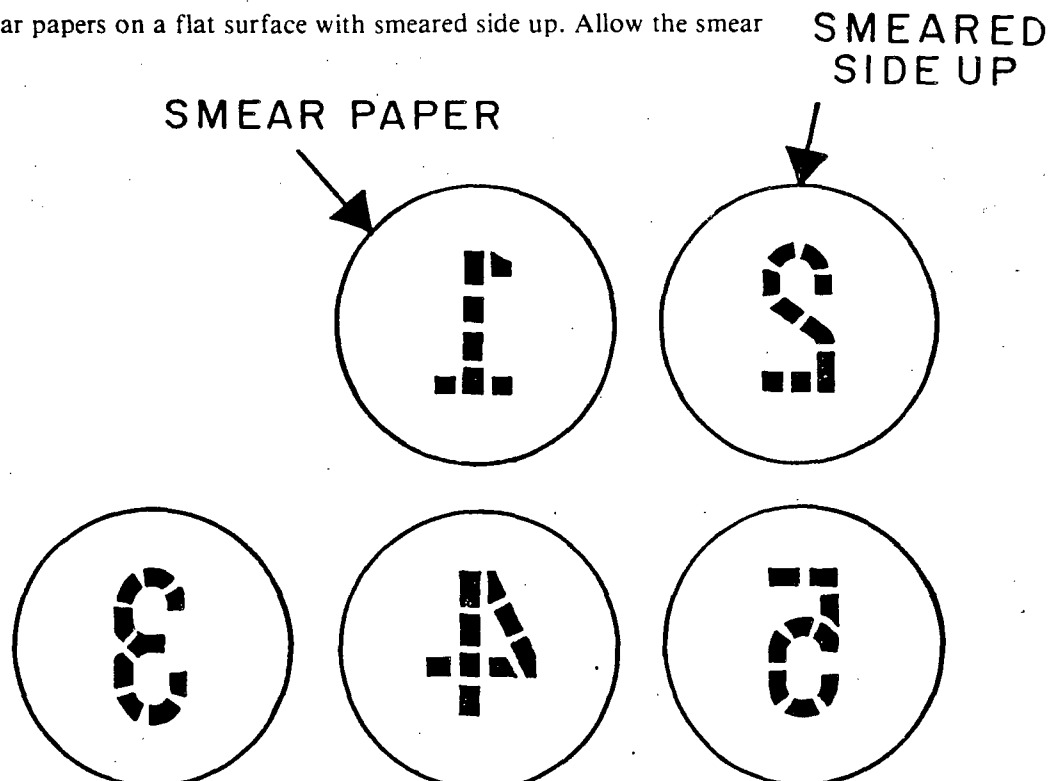


Figure 2-3. Smear Papers.

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e. Position the probe of a calibrated radiac set 1/16 to 1/8 inch above each of the smear papers. Record the meter indication for each smear paper.

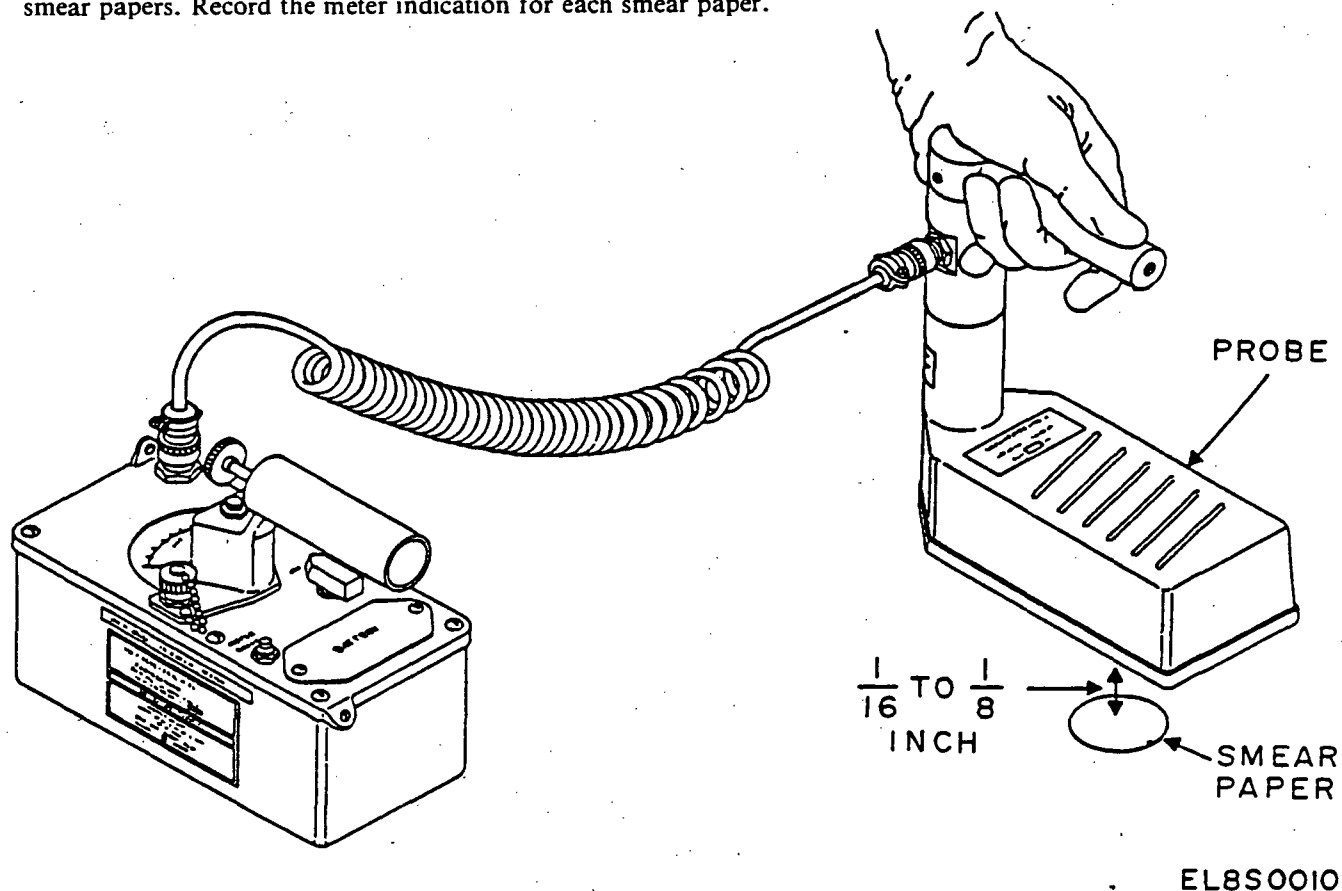


Figure 2-4. Checking Smear Paper After Wipe Test.

f. The radiacmeter indication should be 200 CPM or less above background.

g. If the radiacmeter indicates 200 or more counts-per-minute above background for any single smear paper, consider the AN/UDM-6 unserviceable and remove it from operation until the smear paper is evaluated with laboratory equipment (para 2-3). If the meter indicates less than 200 counts-per-minute, use the AN/UDM-6 pending evaluation of the smear paper.

h. Replace all components in the case and close the case.

i. Remove protective gloves. Dispose as radioactive waste. (Refer to AR 385-11.)

2-3. Smear Paper Laboratory Evaluation

a. AN/UDM-6 using installations/activities will process smear papers as follows:

(1) Place the smear papers, each separated by a sheet of paper, in a small envelope marked with the name and location of the user, the serial number(s) of

the radioactive test sample(s) and the words: MAILROOM—DO NOT OPEN. Seal the envelope for forwarding.

(2) In CONUS, forward the smear papers for evaluation using official mail handling channels to: Chief, US Army Ionizing Radiation Dosimetry Center, ATTN: DRSMI-MCI-DC, Lexington, KY 40511.

(3) Commanders at overseas installations will comply with procedures established by the responsible commander.

b. No maintenance or repair will be performed by the operator. Lexington-Bluegrass Depot Activity (LBDA) is the only authorized facility for maintenance or repair of the AN/UDM-6. Requests for maintenance or repair will be submitted to the RMCP for coordination with CECOM and LBDA.

2-4. Calibration Procedures

This paragraph provides procedures for calibrating Radiac Sets AN/PDR-54 and AN/PDR-60.

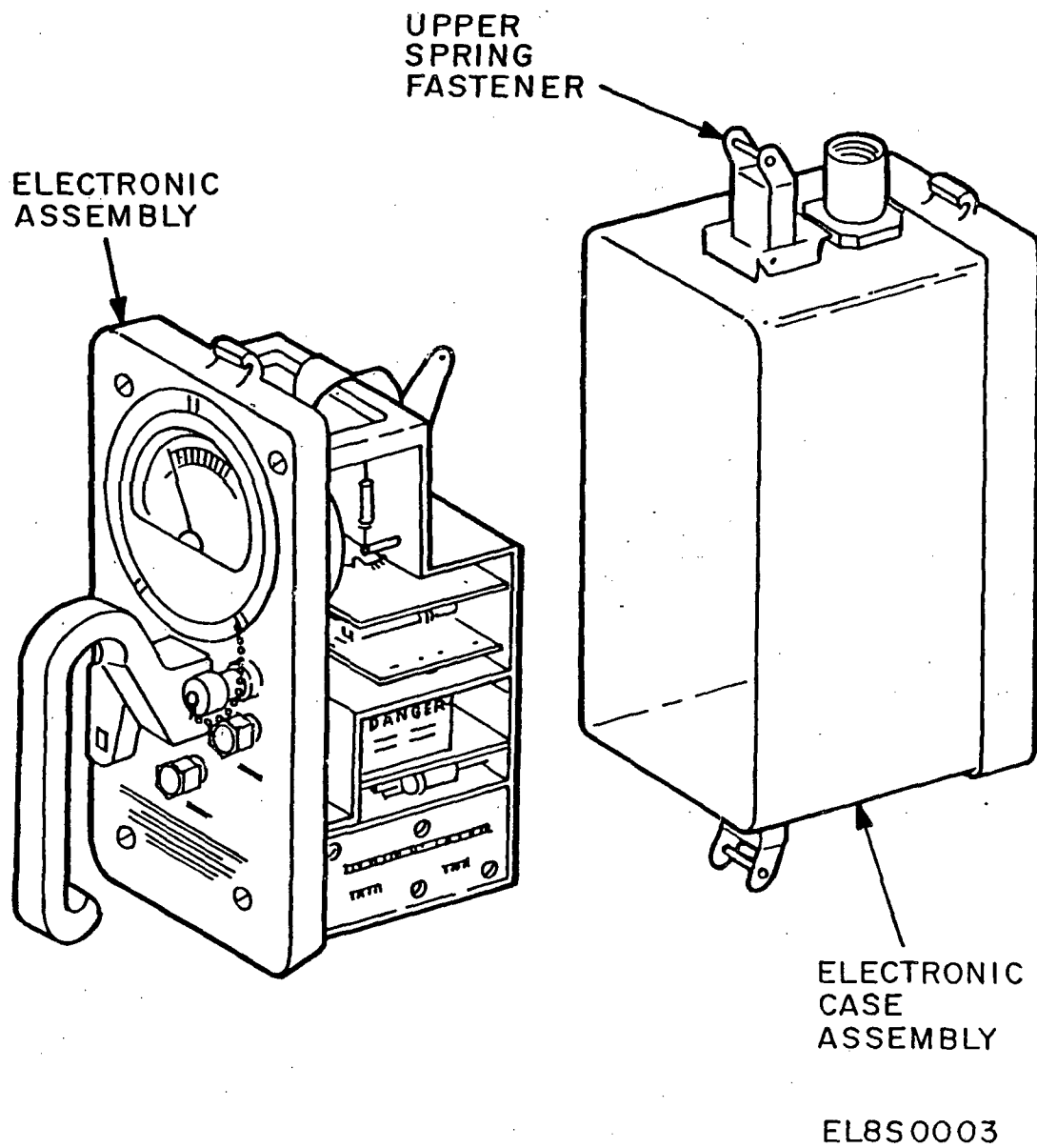
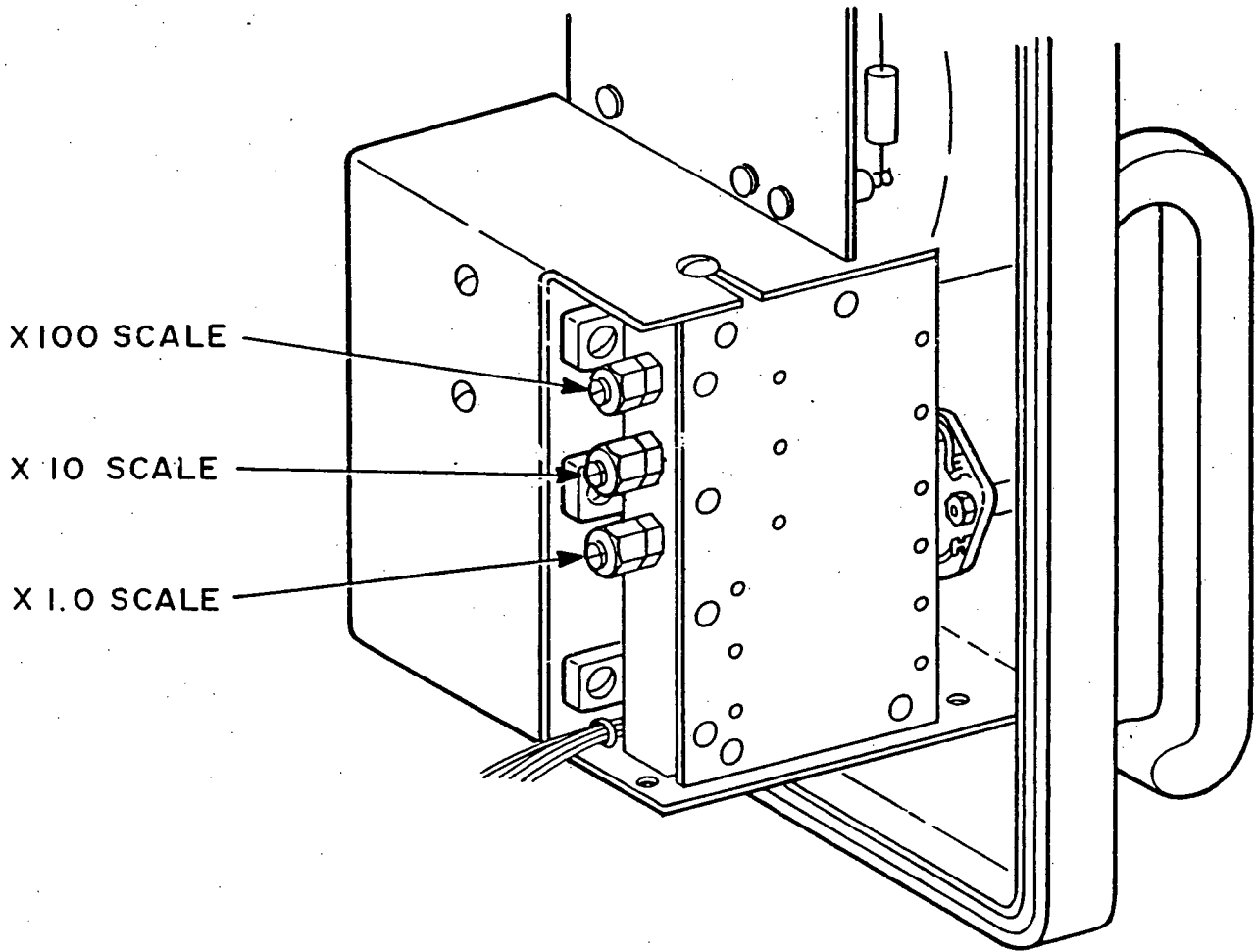


Figure 2-5. Electronic Assembly Removed from Electronic Case Assembly (AN/PDR-54).



EL8S0004

Figure 2-6. AN/PDR-54 Calibration Controls.

WARNING

Always wash and dry your hands after handling the AN/UDM-6. Check your hands with a low-range alpha radiacmeter; repeat the washing and drying, if necessary. Notify the Radiation Protection Officer if washing does not remove contamination.

a. Radiac Set AN/PDR-54.

WARNING

Radiation hazard exists during the following procedure.

- (1) Remove the electronic chassis from the case by releasing the spring catches (fig. 2-5).
- (2) Connect the radiacmeter for bench test.
- (3) Put on protective gloves and open the AN/UDM6 case.
- (4) Place the mask over the 1.4×10^3 CPM (Counts Per Minute) standard source.
- (5) Place the radiacmeter probe on the mask and set the radiacmeter scale switch to the X1 position. Set the gas flow control. Allow 2-minute warm-up time.
- (6) Observe and note the meter indication.

- (7) Remove the radiacmeter probe from the mask.
- (8) Rotate the probe 180 degrees and place it on the mask.
- (9) Observe and note the meter indication.
- (10) Obtain the average of the indications noted in (6) and (9) above. (This is accomplished by adding the two indications and dividing by two.)
- (11) If the averaged indication is higher than 543 CPM, turn calibration control X1.0 SCALE (fig. 2-6) slightly counterclockwise. Repeat procedures in (5) through (10) above and adjust control X1.0 SCALE as necessary to obtain an indication of approximately 532 CPM.
- (12) If the averaged indication is lower than 521 CPM, turn calibration control X1.0 SCALE slightly clockwise. Repeat procedures in (5) through (10) above and adjust calibration control X1.0 SCALE as necessary to obtain an indication of approximately 532 CPM.
- (13) Repeat procedures in (5) through (12) above to calibrate the remaining scales of the radiacmeter. The table below gives the control settings, required meter indication ranges, averaged meter indications, and the standard source to be used.

Standard Source	Scale Switch Setting	Meter Indication Range (PM)	Calibration Control	Averaged Indication (CPM)
1.4×10^4	$\times 10$	5,214 to 5,426	$\times 10$ SCALE	53,200
1.4×10^3	$\times 100$	52,136 to 54,264	$\times 100$ SCALE	53,200

- (14) Set the scale switch to OFF.
- (15) Set the gas flow control to OFF.
- (16) Replace the probe face cover.
- (17) Replace the electronic chassis into the case.
- (18) Secure the AN/UDM-6.
- (19) Remove protective gloves and dispose of as radioactive waste (refer to AR 385-11).
- (20) Wash and dry your hands.
- (21) Check your hands with a low-range alpha radiacmeter; repeat the washing and drying if necessary. NOTIFY THE RADIATION PROTECTION OFFICER IF WASHING DOES NOT REMOVE CONTAMINATION.

b. Radiac Set AN/PDR-60.

WARNING

Radiation hazard exists during the following procedure. Do not touch high voltage terminal until the circuit has been discharged.

- (1) Release the two spring loaded latches (fig. 2-7) and remove the electronic chassis and battery pack from the electronic case assembly.
- (2) Discharge the high voltage circuit to ground (fig. 2-8).

- (3) Connect the center conductor of a shielded jumper lead to the center post of connector CJ-2 (fig. 2-7) in the case assembly.
- (4) Connect the other end of the shielded jumper lead center conductor to the high voltage test and signal injection point on the electronic chassis (fig. 2-8).
- (5) Connect the jumper lead shield to the ground lead contacts in the case assembly and the electronic chassis.
- (6) Connect the AC-3 detector to the electronic chassis.
- (7) Set the detector selector switch to the AC-3 position.
- (8) Set the scale switch to the X1.0 position.
- (9) Check battery condition.
- (10) With the detector face protective cover in place, adjust the AC-3 DISCR control until the radiacmeter indicates approximately 50 CPM average.
- (11) Lock the DISCR control.

NOTE

Occasionally the average meter indication will be less than 50 CPM. If this occurs, lock the DISCR control in the fully counterclockwise position.

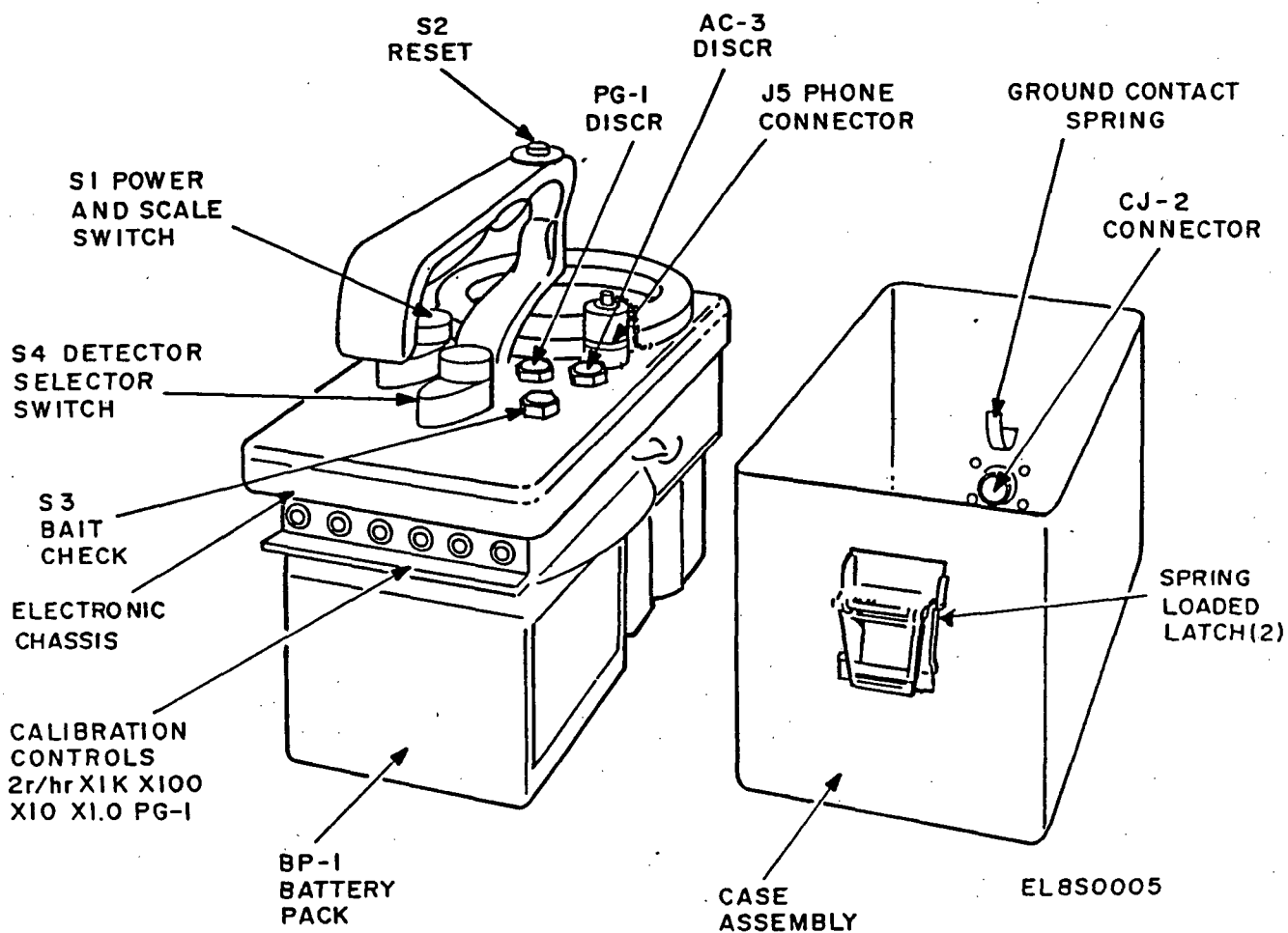


Figure 2-7. AN/PDR, Calibration Controls.

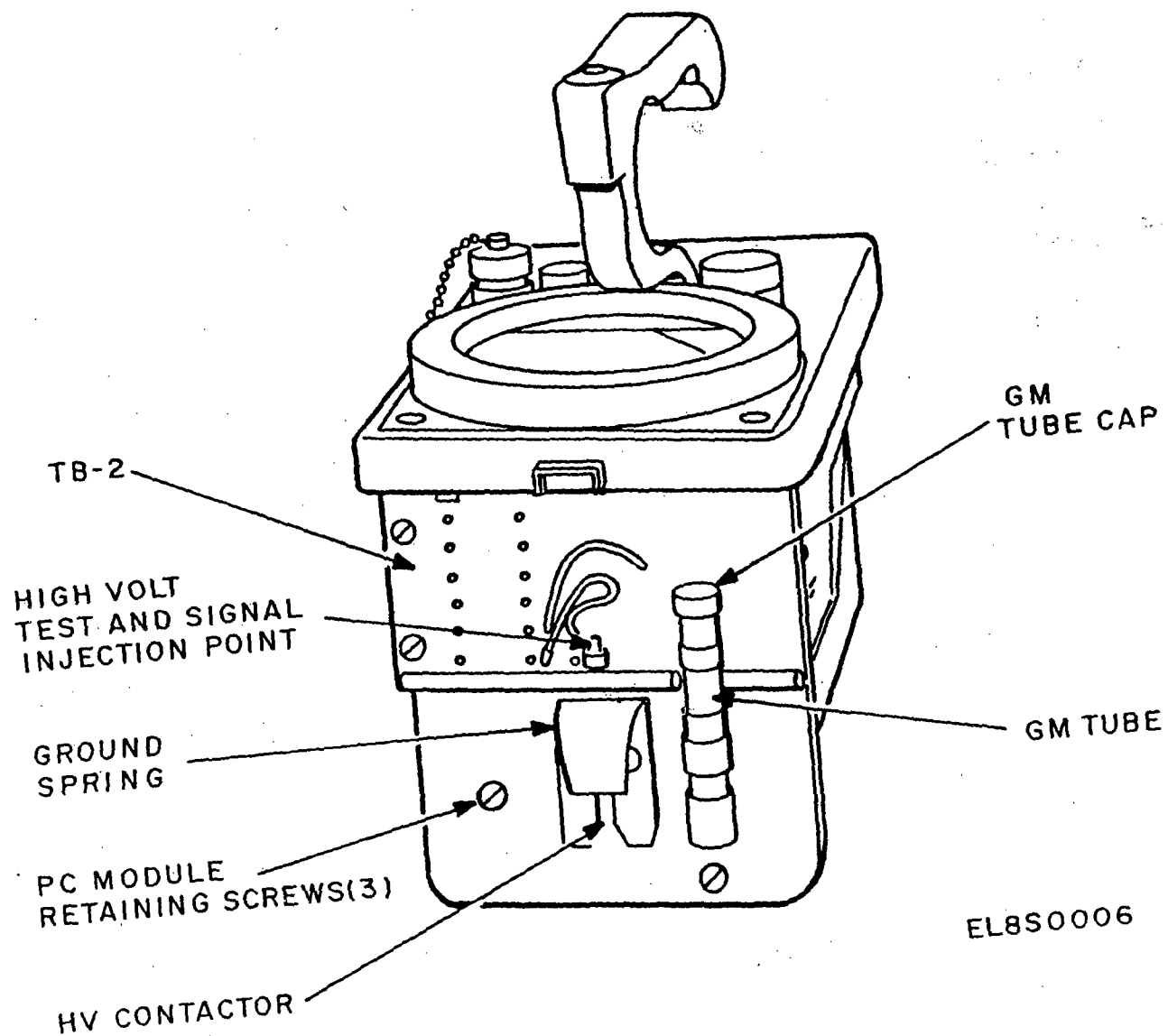


Figure 2-8. AN/PDR-60, Electronic Chassis.

(12) Put on protective gloves and open the AN/UDM-6 case.

(13) Remove the detector face protective cover.

(14) Place the detector on the 1.4×10^3 CPM standard source.

(15) Observe and note the meter indication.

(16) Rotate the detector 180 degrees and place it on the 1.4×10^3 CPM standard source.

(17) Observe and note the meter indication.

(18) Obtain the average of the meter indications noted in (15) and (17) above. (This is accomplished by adding the two indications and dividing by two.) The average indication should be within ± 10 percent of the standard source CPM.

(19) If the average CPM is not as indicated in (18) above, adjust $\times 1.0$ calibration control (fig. 2-8) on the electronic chassis.

(20) Repeat (14) through (19) above if the calibration control has to be adjusted.

(21) Repeat (14) through (19) above for the other

scales of the radiacmeter, adjusting the calibration control for the scale being used, if required.

(22) Recheck the DISCR adjustment (10) above. If the DISCR control requires adjustment, the calibration procedure must be repeated.

(23) Set the scale switch to OFF.

(24) Discharge the high voltage circuit to ground.

(25) Disconnect the AC-3 detector.

(26) Remove the shielded jumper lead.

(27) Replace the electronic chassis into the electronic case assembly.

(28) Secure the AN/UDM-6.

(29) Remove protective gloves and dispose of as radioactive waste (refer to AR 385-11).

(30) Wash and dry your hands.

(31) Check your hands with a low-range alpha radiacmeter; repeat the washing and drying if necessary. NOTIFY THE RADIATION PROTECTION OFFICER IF WASHING DOES NOT REMOVE CONTAMINATION.

CHAPTER 3 MAINTENANCE INSTRUCTIONS

3-1. Troubleshooting Procedures

a. Table 3-1 lists the common malfunctions which you may find during the operation or maintenance of the AN/UDM-6 or its components. You should perform the tests/inspections and corrective actions in the

order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

Table 3-1. Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1. SOURCE DAMAGE. <div style="margin-left: 20px;">Step 1. Use a similar type radiac calibrator and obtain a set of readings.</div> <div style="margin-left: 20px;">Step 2. Compare the two sets of readings with readings obtained from damaged calibrator before damage occurred.</div> <div style="margin-left: 40px;">If readings are still erroneous, contact: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-SF-MR, Fort Monmouth, NJ 07703; or call AUTOVON 995-4427, for further instructions.</div>
2. CALIBRATION MALFUNCTION. <div style="margin-left: 20px;">Step 1. Verify that the radiac set is intended to be calibrated with the AN/UDM-6.</div> <div style="margin-left: 20px;">Step 2. Verify that the correct accessories (i.e., source and attenuator) are being used for the radiac set being calibrated.</div> <div style="margin-left: 40px;">If a malfunction still exists, return the radiac set to the using activity with instructions to return the radiac set to the appropriate maintenance facility (depot) for the required maintenance or repair.</div>

3-2. Operator Maintenance

a. The operator is limited to inspection and initial checks and services. No other maintenance or repair will be performed by the operator. LBDA is the only authorized facility for maintenance or repair.

b. Requests for maintenance or repair will be submitted to the radioactive material control point for coordination with the CECOM National Inventory Control Point and LBDA. Points of contact are:

CECOM National Inventory Control Point (NICP)
Commander, US Army Communications-Electronics
Command and Fort Monmouth
ATTN: DRSEL-MME-VC
Fort Monmouth, NJ 07703

CECOM National Maintenance Point (NMP)
Commander, US Army Communications-Electronics
Command and Fort Monmouth
ATTN: DRSEL-ME-ES
Fort Monmouth, NJ 07703

3-3. Storage

a. Store the AN/UDM-6 only in fire-resistant buildings (TM 5-812-1) and in rooms/areas/sections designated for storage of radioactive materials which are free from the danger of flooding, outside the danger of radius of flammables or explosives, and secured against unauthorized removal.

b. Post the area/building with CAUTION -RADIOACTIVE MATERIAL signs as required by AR 385-30.

3-4. Disposition

Reports of excess, unwanted or unserviceable AN/UDM-6's are submitted to the CECOM NICP for review for serviceability, turn-in or disposal as radioactive waste. Requests for disposition instructions are submitted through radiation control command channels to this NICP. The NICP will provide instructions for shipment of the AN/UDM-6 to the appropriate depot.

APPENDIX A REFERENCES

A-1. General

This appendix lists all forms, technical manuals, and miscellaneous publications referenced in this manual and/or to be utilized in relation to this equipment.

A-2. Forms

Equipment Inspection and Maintenance Worksheet	DA Form 2404
Recommended Changes to Publications	DA Form 2028
Recommended Changes to Equipment Technical Publications	DA Form 2028-2
Punched Transmission Worksheet-Radioisotope Inventory and Leak Test Report	DA Form 3252-R
Notice to Employees	NRC-3
Radiological Accident Report	RCSDD-SD 1168
Quality Deficiency Report	SF 368
Radioactive I	SF 413
Report of Item Discrepancy (ROD)	SF 364
Preventive Maintenance Schedule and Record	DD Form 314

A-3. Technical Manuals

Handling and Disposal of Unwanted Radioactive Material	TM 3-261
Fire Prevention Manual	TM 5-812-1
List of Applicable Publications (LOAP) for Communications Electronic Equipment ..	TM 11-5800-213-L
Operator's, Organizational, Direct Support, General Support, and Depot Maintenance Manual: Radiac Set AN/PDR-54 (NSN 6665-00-542-1587)	TM 11-6665-208-15
Operator's, Organizational, Direct Support, General Support, and Depot Maintenance Manual: Radiac Set AN/PDR-60 (NSN 6665-00-965-1516)	TM 11-6665-221-15
Operator's and Organizational Maintenance Manual for Radiac Set AN/PDR-56F (NSN 6665-00-211-6895)	TM 11-6665-245-12
The Army Maintenance Management System (TAMMS)	TM 38-750
Transportability Guidance for Safe Transport of Radioactive Materials	TM 55-315

A-4. Miscellaneous Publications

Health and Environment	AR 40-5
Control and Recording Procedure for Occupational Exposure to Ionizing Radiation ..	AR 40-14
Reporting of Transportation Discrepancies in Shipment	AR 55-38
Ionizing Radiation Protection (Receiving, Control, Transportation, Disposal, and Radiation Safety)	AR 385-11
Safety Color Code Markings and Signs	AR 385-30
Accident Reporting and Records	AR 385-40
Radioactive Commodities in the DOD Supply System	AR 700-64
Reporting of Item and Packaging Discrepancies	AR 735-11-2
Index of Technical Publications	DA Pam 310-1

APPENDIX B

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

B-1. Scope

This appendix lists expendable supplies and materials you will need to operate and maintain the AN/UDM-6. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

B-2. Explanation of Columns

a. Column 1 — Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use plastic gloves, Item 1, Appx D").

b. Column 2 — Level. This column identifies the lowest level of maintenance that requires the item.

C — Operator/Crew

c. Column 3 — National Stock Number. This is the National Stock Number assigned to the item; use it to request or requisition the item.

d. Column 4 — Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable.

e. Column 5 — Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

(Next printed page is B-2)

SECTION II EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NO. AND FSCM	(5) UNIT OF MEAS
1	C	8415-00-682-6786	GLOVES, DISPOSAL PINKIES (96717)	PR
2	C	8540-00-291-0391	TOWEL, PAPER UU-7-591 (81348)	BX

Form NRC-3
(1-80)
10 CFR 19
10 CFR 20



UNITED STATES NUCLEAR REGULATORY COMMISSION
Washington, D.C. 20555

NOTICE TO EMPLOYEES

STANDARDS FOR PROTECTION AGAINST RADIATION (PART 20); NOTICES, INSTRUCTIONS AND REPORTS TO WORKERS; INSPECTIONS (PART 19)

In Part 20 of its Rules and Regulations, the Nuclear Regulatory Commission has established standards for your protection against radiation hazards from radioactive material under license issued by the Nuclear Regulatory Commission. In Part 19 of its Rules and Regulations, the Nuclear Regulatory Commission has established certain provisions for the options of workers engaged in NRC-licensed activities.

YOUR EMPLOYER'S RESPONSIBILITY

Your employer is required to—

1. Apply these NRC regulations and the conditions of his NRC license to all work under the license.
2. Post or otherwise make available to you a copy of the NRC regulations, licenses, and operating procedures which apply to work you are engaged in, and explain their provisions to you;
3. Post Notices of Violation Involving radiological working conditions, proposed imposition of civil penalties and orders.

YOUR RESPONSIBILITY AS A WORKER

You should familiarize yourself with those provisions of the NRC regulations, and the operating procedures which apply to the work you are engaged in. You should observe their provisions for your own protection and protection of your co-workers.

WHAT IS COVERED BY THESE NRC REGULATIONS

1. Limits on exposure to radiation and radioactive material in restricted and unrestricted areas;
2. Measures to be taken after accidental exposure;
3. Personnel monitoring, surveys and equipment;
4. Caution signs, labels, and safety interlock equipment;
5. Exposure records and reports;
6. Options for workers regarding NRC inspections; and
7. Related matters.

REPORTS ON YOUR RADIATION EXPOSURE HISTORY

1. The NRC regulations require that your employer give you a written report if you receive an

exposure in excess of any applicable limit as set forth in the regulations or in the license. The basic limits for exposure to employees are set forth in Sections 20.101, 20.103, and 20.104 of the Part 20 regulations. These Sections specify limits on exposure to radiation and exposure to concentrations of radioactive material in air.

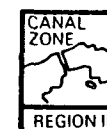
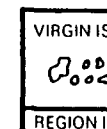
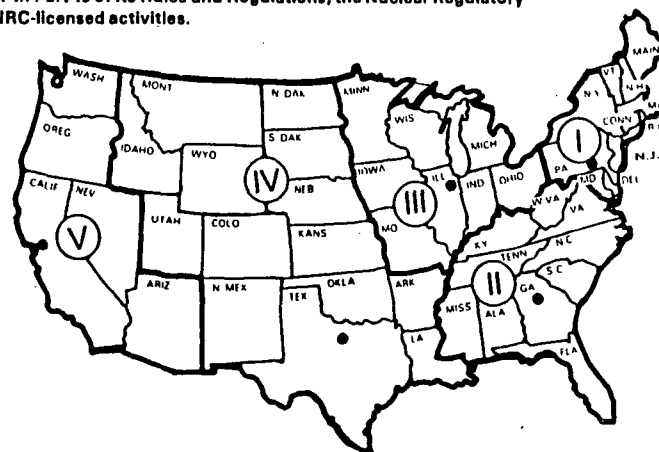
2. If you work where personnel monitoring is required pursuant to Section 20.202;
 - (a) your employer must give you a written report of your radiation exposures upon the termination of your employment, if you request it, and
 - (b) your employer must advise you annually of your exposure to radiation, if you request it.

INSPECTIONS

All activities under the license are subject to inspection by representatives of the NRC. In addition, any worker or representative of workers who believes that there is a violation of the Atomic Energy Act of 1954, the regulations issued thereunder, or the terms of the employer's license with regard to radiological working conditions in which the worker is engaged, may request an inspection by sending a notice of the alleged violation to the appropriate United States Nuclear Regulatory Commission Inspection and Enforcement Regional Office (shown on map at right). The request must set forth the specific grounds for the notice, and must be signed by the worker or the representative of the workers. During inspections, NRC inspectors may confer privately with workers, and any worker may bring to the attention of the inspectors any past or present condition which he believes contributed to or caused any violation as described above.

POSTING REQUIREMENTS

Copies of this notice must be posted in a sufficient number of places in every establishment where activities licensed by the NRC are conducted, to permit employees working in or frequenting any portion of a restricted area to observe a copy on the way to or from their place of employment.



UNITED STATES NUCLEAR REGULATORY COMMISSION

A representative of the Nuclear Regulatory Commission can be contacted at the following addresses and telephone numbers. The Regional Office will accept collect telephone calls from employees who wish to register complaints or concerns about radiological working conditions or other matters regarding compliance with Commission rules and regulations.

Regional Offices

REGION	ADDRESS	TELEPHONE	
		DAYTIME	NIGHTS AND HOLIDAYS
I	Region I, Office of Inspection and Enforcement, USNRC 631 Park Avenue King of Prussia, Pennsylvania 19406	215 337-5000	215 337-5000
II	Region II, Office of Inspection and Enforcement, USNRC 101 Marietta St., N.W., Suite 3100 Atlanta, Georgia 30303	404 221-4503	404 221-4503
III	Region III, Office of Inspection and Enforcement, USNRC 799 Roosevelt Road Glen Ellyn, Illinois 60137	312 932-2500	312 932-2500
IV	Region IV, Office of Inspection and Enforcement, USNRC 611 Ryan Plaza Drive, Suite 1000 Arlington, Texas 76012	817 334-2841	817 334-2841
V	Region V, Office of Inspection and Enforcement, USNRC 1990 N. California Boulevard, Suite 202, Walnut Creek Plaza Walnut Creek, California 94596	415 943-3700	415 943-3700

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



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DOPE ABOUT IT ON THIS
FORM. CAREFULLY TEAR IT
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IN THE MAIL.

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

Commander,
Stateside Army Depot
ATTN: AMSTA-US
Stateside, N.J. 07703

DATE SENT

10 July 1975

PUBLICATION NUMBER

TM 11-5840-340-12

PUBLICATION DATE

23 Jan 74

PUBLICATION TITLE

Radar Set AN/PRC-76

BE EXACT... PIN-POINT WHERE IT IS

PAGE NO	PARA- GRAPH	FIGURE NO	TABLE NO
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2-25	2-28		
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3-10	3-3		
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		3-1	
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5-6	5-8		
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		F03	
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IN THIS SPACE TELL WHAT IS WRONG
AND WHAT SHOULD BE DONE ABOUT IT:

Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°.

REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.

Item 5, Function column. Change "2 db" to "3db."

REASON: The adjustment procedure the the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.

Add new step f.1 to read, "Replace cover plate removed step e.1, above."

REASON: To replace the cover plate.

Zone C 3. On J1-2, change "+24 VDC to "+5 VDC."

REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SSG I. M. DeSpirito 999-1776

SIGN HERE

[Signature]

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PUBLICATION NUMBER

TM 11-6665-248-10

PUBLICATION DATE

26 NOV 82

PUBLICATION TITLE

Calibrator, Radiac, AN/UDM-6

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FIGURE
NO.

TABLE
NO.

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AND WHAT SHOULD BE DONE ABOUT IT:

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